

113TH CONGRESS  
1ST SESSION

# S. 488

To provide for a program of research, development, demonstration, and commercial application in vehicle technologies at the Department of Energy.

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## IN THE SENATE OF THE UNITED STATES

MARCH 7, 2013

Ms. STABENOW introduced the following bill; which was read twice and referred to the Committee on Energy and Natural Resources

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# A BILL

To provide for a program of research, development, demonstration, and commercial application in vehicle technologies at the Department of Energy.

1       *Be it enacted by the Senate and House of Representa-*  
2       *tives of the United States of America in Congress assembled,*

3       **SECTION 1. SHORT TITLE; TABLE OF CONTENTS.**

4       (a) SHORT TITLE.—This Act may be cited as the  
5       “Advanced Vehicle Technology Act of 2013”.

6       (b) TABLE OF CONTENTS.—The table of contents of  
7       this Act is as follows:

- Sec. 1. Short title; table of contents.
- Sec. 2. Objectives.
- Sec. 3. Definitions.
- Sec. 4. Coordination and nonduplication.

## TITLE I—VEHICLE RESEARCH AND DEVELOPMENT

- Sec. 101. Program.
- Sec. 102. Sensing and communications technologies.
- Sec. 103. Manufacturing.
- Sec. 104. Reporting.

## TITLE II—MEDIUM AND HEAVY DUTY COMMERCIAL AND TRANSIT VEHICLES

- Sec. 201. Program.
- Sec. 202. Class 8 truck and trailer systems demonstration.
- Sec. 203. Technology testing and metrics.
- Sec. 204. Nonroad systems pilot program.
- Sec. 205. Repeal of existing authorities.

1 **SEC. 2. OBJECTIVES.**

2       The objectives of this Act are—

3               (1) to reform and reorient the vehicle technologies programs of the Department;

5               (2) to establish a clear and consistent authority for vehicle technologies programs of the Department;

7               (3) to develop United States technologies and practices that—

9                       (A) improve the fuel efficiency and emissions of all vehicles produced in the United States; and

12                       (B) reduce vehicle reliance on petroleum-based fuels;

14               (4) to support domestic research, development, engineering, demonstration, and commercial application and manufacturing of advanced vehicles, engines, and components;

1                         (5) to enable vehicles to move larger volumes of  
2                         goods and more passengers with less energy and  
3                         emissions;

4                         (6) to develop cost-effective advanced technologies for wide-scale utilization throughout the  
5                         passenger, commercial, government, and transit ve-  
6                         hicle sectors;

7                         (7) to allow for greater consumer choice of vehi-  
8                         cle technologies and fuels;

9                         (8) to shorten technology development and inte-  
10                         gration cycles in the vehicle industry;

11                         (9) to ensure a proper balance and diversity of  
12                         Federal investment in vehicle technologies and  
13                         among vehicle classes; and

14                         (10) to strengthen partnerships between Fed-  
15                         eral and State governmental agencies and the pri-  
16                         vate and academic sectors.

17                         **18 SEC. 3. DEFINITIONS.**

19                         In this Act:

20                         (1) DEPARTMENT.—The term “Department”  
21                         means the Department of Energy.

22                         (2) SECRETARY.—The term “Secretary” means  
23                         the Secretary of Energy.

1   **SEC. 4. COORDINATION AND NONDUPLICATION.**

2       (a) COORDINATION.—The Secretary shall ensure that  
3   activities authorized by this Act do not duplicate activities  
4   of other programs within the Department or other rel-  
5   evant agencies.

6       (b) COST-SHARING REQUIREMENT.—The activities  
7   carried out under this Act shall be subject to the cost-  
8   sharing requirements of section 988 of the Energy Policy  
9   Act of 2005 (42 U.S.C. 16352).

10      **TITLE I—VEHICLE RESEARCH  
11           AND DEVELOPMENT**

12      **SEC. 101. PROGRAM.**

13       (a) ACTIVITIES.—The Secretary shall conduct a pro-  
14   gram of basic and applied research, development, engi-  
15   neering, demonstration, and commercial application activi-  
16   ties on materials, technologies, and processes with the po-  
17   tential to substantially reduce or eliminate petroleum use  
18   and the emissions of the Nation’s passenger and commer-  
19   cial vehicles, including activities in the areas of—

20           (1) hybridization or full electrification of vehicle  
21   systems;

22           (2) batteries, ultracapacitors, and other energy  
23   storage devices;

24           (3) power electronics;

25           (4) vehicle, component, and subsystem manu-  
26   facturing technologies and processes;

- (5) engine efficiency and combustion optimization;
- (6) waste heat recovery;
- (7) transmission and drivetrains;
- (8) hydrogen vehicle technologies, including fuel cells and internal combustion engines, and hydrogen infrastructure;
- (9) compressed natural gas and liquefied petroleum gas vehicle technologies;
- (10) aerodynamics, rolling resistance, and accessory power loads of vehicles and associated equipment;
- (11) vehicle weight reduction, including lightweighting materials;
- (12) friction and wear reduction;
- (13) engine and component durability;
- (14) innovative propulsion systems;
- (15) advanced boosting systems;
- (16) hydraulic hybrid technologies;
- (17) engine compatibility with and optimization for a variety of transportation fuels including natural gas and other liquid and gaseous fuels;
- (18) predictive engineering, modeling, and simulation of vehicle and transportation systems;

- 1                         (19) refueling and charging infrastructure for  
2 alternative fueled and electric or plug-in electric hy-  
3 brid vehicles, including the unique challenges facing  
4 rural areas;
- 5                         (20) gaseous fuels storage systems and system  
6 integration and optimization;
- 7                         (21) sensing, communications, and actuation  
8 technologies for vehicle, electrical grid, and infra-  
9 structure;
- 10                        (22) efficient use, substitution, and recycling of  
11 potentially critical materials in vehicles, including  
12 rare earth elements and precious metals, at risk of  
13 supply disruption;
- 14                        (23) aftertreatment technologies;
- 15                        (24) thermal management of battery systems;
- 16                        (25) retrofitting advanced vehicle technologies  
17 to existing vehicles;
- 18                        (26) development of common standards, speci-  
19 fications, and architectures for both transportation  
20 and stationary battery applications;
- 21                        (27) advanced internal combustion engines; and
- 22                        (28) other research areas as determined by the  
23 Secretary.

24                       (b) TRANSFORMATIONAL TECHNOLOGY.—The Sec-  
25 retary shall ensure that the Department continues to sup-

1 port research, development, engineering, demonstration,  
2 and commercial application activities and maintains com-  
3 petency in mid- to long-term transformational vehicle tech-  
4 nologies with potential to achieve deep reductions in petro-  
5 leum use and emissions, including activities in the areas  
6 of—

7                 (1) hydrogen vehicle technologies, including fuel  
8                 cells, internal combustion engines, hydrogen storage,  
9                 infrastructure, and activities in hydrogen technology  
10                 validation and safety codes and standards;

11                 (2) multiple battery chemistries and novel en-  
12                 ergy storage devices, including nonchemical bat-  
13                 teries, ultracapacitors and electromechanical storage  
14                 technologies such as hydraulics, flywheels, and com-  
15                 pressed air storage;

16                 (3) communication, connectivity, and power  
17                 flow among vehicles, infrastructure, and the elec-  
18                 trical grid; and

19                 (4) other innovative technologies research and  
20                 development, as determined by the Secretary.

21                 (c) INDUSTRY PARTICIPATION.—To the maximum  
22 extent practicable, activities under this Act shall be carried  
23 out in partnership or collaboration with automotive manu-  
24 facturers, heavy commercial, vocational, and transit vehi-  
25 cle manufacturers, qualified plug-in electric vehicle manu-

1 manufacturers, compressed natural gas and liquefied petroleum  
2 gas vehicle manufacturers, vehicle and engine equipment  
3 and component manufacturers, manufacturing equipment  
4 manufacturers, advanced vehicle service providers, fuel  
5 producers and energy suppliers, electric utilities, univer-  
6 sities, national laboratories, and independent research lab-  
7 oratories. In carrying out this Act the Secretary shall—

8 (1) determine whether a wide range of compa-  
9 nies that manufacture or assemble vehicles or com-  
10 ponents in the United States are represented in on-  
11 going public private partnership activities, including  
12 firms that have not traditionally participated in fed-  
13 erally sponsored research and development activities,  
14 and where possible, partner with such firms that  
15 conduct significant and relevant research and devel-  
16 opment activities in the United States;

17 (2) leverage the capabilities and resources of,  
18 and formalize partnerships with, industry-led stake-  
19 holder organizations, nonprofit organizations, indus-  
20 try consortia, and trade associations with expertise  
21 in the research and development of, and education  
22 and outreach activities in, advanced automotive and  
23 commercial vehicle technologies;

1                         (3) develop more efficient processes for trans-  
2                         ferring research findings and technologies to indus-  
3                         try;

4                         (4) give consideration to conversion of existing  
5                         or former vehicle technology development or manu-  
6                         facturing facilities for the purposes of this Act;

7                         (5) establish and support public-private part-  
8                         nerships, dedicated to overcoming barriers in com-  
9                         mercial application of transformational vehicle tech-  
10                         nologies, that utilize such industry-led technology de-  
11                         velopment facilities of entities with demonstrated ex-  
12                         pertise in successfully designing and engineering  
13                         pre-commercial generations of such transformational  
14                         technology; and

15                         (6) promote efforts to ensure that technology  
16                         research, development, engineering, and commercial  
17                         application activities funded under this Act are car-  
18                         ried out in the United States.

19                         (d) INTERAGENCY AND INTRAAGENCY COORDINA-  
20                         TION.—To the maximum extent practicable, the Secretary  
21                         shall coordinate research, development, demonstration,  
22                         and commercial application activities among—

23                         (1) relevant programs within the Department,  
24                         including—

(A) the Office of Energy Efficiency and  
Renewable Energy;

3 (B) the Office of Science;

(C) the Office of Electricity Delivery and  
Energy Reliability;

(D) the Office of Fossil Energy;

(E) the Advanced Research Projects Agency—Energy; and

15       (e)     FEDERAL     DEMONSTRATION     OF     TECH-  
16 NOLOGIES.—The Secretary shall make information avail-  
17 able to procurement programs of Federal agencies regard-  
18 ing the potential to demonstrate technologies resulting  
19 from activities funded through programs under this Act.

20           (f) INTERGOVERNMENTAL COORDINATION.—The  
21 Secretary shall seek opportunities to leverage resources  
22 and support initiatives of State and local governments in  
23 developing and promoting advanced vehicle technologies,  
24 manufacturing, and infrastructure.

1       (g) CRITERIA.—When awarding cost-shared grants  
2 under this program, the Secretary shall give priority to  
3 those technologies (either individually or as part of a sys-  
4 tem) that—

- 5                 (1) provide the greatest aggregate fuel savings  
6 based on the reasonable projected sales volumes of  
7 the technology; and  
8                 (2) provide the greatest increase in United  
9 States employment.

10 **SEC. 102. SENSING AND COMMUNICATIONS TECH-**  
11 **NOLOGIES.**

12       (a) IN GENERAL.—The Secretary, in coordination  
13 with the Secretary of Transportation and the relevant re-  
14 search programs of other Federal agencies, shall conduct  
15 research, development, engineering, and demonstration ac-  
16 tivities on connectivity of vehicle and transportation sys-  
17 tems, including on sensing, computation, communication,  
18 and actuation technologies that allow for reduced fuel use,  
19 optimized traffic flow, and vehicle electrification, including  
20 technologies for—

- 21                 (1) onboard vehicle, engine, and component  
22 sensing and actuation;  
23                 (2) vehicle-to-vehicle sensing and communica-  
24 tion;

(3) vehicle-to-infrastructure sensing and communication; and

(4) vehicle integration with the electrical grid,  
including communications to provide grid services.

5 (b) COORDINATION.—The activities carried out under  
6 this section shall supplement (and not supplant) activities  
7 under the intelligent transportation system research pro-  
8 gram of the Department of Transportation.

## **9 SEC. 103. MANUFACTURING.**

10 The Secretary shall carry out a research, develop-  
11 ment, engineering, demonstration, and commercial appli-  
12 cation program of advanced vehicle manufacturing tech-  
13 nologies and practices, including innovative processes to—

14 (1) increase the production rate and decrease  
15 the cost of advanced battery manufacturing;

22 (4) recycle and remanufacture used batteries  
23 and other vehicle components for reuse in vehicles or  
24 stationary applications;

- 1                   (5) produce cost-effective lightweight materials
- 2                   such as advanced metal alloys, polymeric composites,
- 3                   and carbon fiber;
- 4                   (6) produce lightweight high pressure storage
- 5                   systems for gaseous fuels;
- 6                   (7) design and manufacture purpose-built hy-
- 7                   drogen and fuel cell vehicles and components;
- 8                   (8) improve the calendar life and cycle life of
- 9                   advanced batteries; and
- 10                  (9) produce permanent magnets for advanced
- 11                  vehicles.

12 **SEC. 104. REPORTING.**

13                  (a) TECHNOLOGIES DEVELOPED.—Not later than 18

14 months after the date of enactment of this Act and annu-

15 ally thereafter through 2017, the Secretary of Energy

16 shall transmit to Congress a report regarding the tech-

17 nologies developed as a result of the activities authorized

18 by this title, with a particular emphasis on whether the

19 technologies were successfully adopted for commercial ap-

20 plications, and if so, whether products relying on those

21 technologies are manufactured in the United States.

22                  (b) ADDITIONAL MATTERS.—At the end of each fis-

23 cal year through 2017 the Secretary shall submit to the

24 relevant Congressional committees of jurisdiction an an-

25 nual report describing activities undertaken in the pre-

1 vious year under this title, active industry participants, ef-  
2 forts to recruit new participants committed to design, en-  
3 gineering, and manufacturing of advanced vehicle tech-  
4 nologies in the United States, progress of the program in  
5 meeting goals and timelines, and a strategic plan for fund-  
6 ing of activities across agencies.

7 **TITLE II—MEDIUM AND HEAVY  
8 DUTY COMMERCIAL AND  
9 TRANSIT VEHICLES**

10 **SEC. 201. PROGRAM.**

11 (a) IN GENERAL.—The Secretary, in partnership  
12 with relevant research and development programs in other  
13 Federal agencies, and a range of appropriate industry  
14 stakeholders, shall carry out a program of cooperative re-  
15 search, development, demonstration, and commercial ap-  
16 plication activities on advanced technologies for medium-  
17 to heavy-duty commercial, vocational, recreational, and  
18 transit vehicles, including activities in the areas of—

- 19 (1) engine efficiency and combustion research;  
20 (2) onboard storage technologies for compressed  
21 natural gas and liquefied petroleum gas;  
22 (3) development and integration of engine tech-  
23 nologies designed for compressed natural gas and  
24 liquefied petroleum gas operation of a variety of ve-  
25 hicle platforms;

- (4) waste heat recovery and conversion;
  - (5) improved aerodynamics and tire rolling resistance;
  - (6) energy and space-efficient emissions control systems;
  - (7) heavy hybrid, hybrid hydraulic, plug-in hybrid, and electric platforms, and energy storage technologies;
  - (8) drivetrain optimization;
  - (9) friction and wear reduction;
  - (10) engine idle and parasitic energy loss reduction;
  - (11) electrification of accessory loads;
  - (12) onboard sensing and communications technologies;
  - (13) advanced lightweighting materials and vehicle designs;
  - (14) increasing load capacity per vehicle;
  - (15) thermal management of battery systems;
  - (16) recharging infrastructure;
  - (17) compressed natural gas and liquefied petroleum gas infrastructure;
  - (18) advanced internal combustion engines;
  - (19) complete vehicle modeling and simulation;

1                   (20) hydrogen vehicle technologies, including  
2                   fuel cells and internal combustion engines, and hy-  
3                   drogen infrastructure;

4                   (21) retrofitting advanced technologies onto ex-  
5                   isting truck fleets; and

6                   (22) integration of these and other advanced  
7                   systems onto a single truck and trailer platform.

8                 (b) LEADERSHIP.—The Secretary shall appoint a  
9                   full-time Director to coordinate research, development,  
10                  demonstration, and commercial application activities in  
11                  medium- to heavy-duty commercial, recreational, and trans-  
12                  sit vehicle technologies. Responsibilities of the Director  
13                  shall be to—

14                 (1) improve coordination and develop consensus  
15                  between government agency and industry partners,  
16                  and propose new processes for program management  
17                  and priority setting to better align activities and  
18                  budgets among partners;

19                 (2) regularly convene workshops, site visits,  
20                  demonstrations, conferences, investor forums, and  
21                  other events in which information and research find-  
22                  ings are shared among program participants and in-  
23                  terested stakeholders;

24                 (3) develop a budget for the Department's ac-  
25                  tivities with regard to the interagency program, and

1 provide consultation and guidance on vehicle tech-  
2 nology funding priorities across agencies;

3 (4) determine a process for reviewing program  
4 technical goals, targets, and timetables and, where  
5 applicable, aided by life-cycle impact and cost anal-  
6 ysis, propose revisions or elimination based on pro-  
7 gram progress, available funding, and rate of tech-  
8 nology adoption;

9 (5) evaluate ongoing activities of the program  
10 and recommend project modifications, including the  
11 termination of projects, where applicable;

12 (6) recruit new industry participants to the  
13 interagency program, including truck, trailer, and  
14 component manufacturers who have not traditionally  
15 participated in federally sponsored research and  
16 technology development activities; and

17 (7) other responsibilities as determined by the  
18 Secretary, in consultation with interagency and in-  
19 dustry partners.

20 (c) REPORTING.—At the end of each fiscal year, the  
21 Secretary shall submit to the Congress an annual report  
22 describing activities undertaken in the previous year, ac-  
23 tive industry participants, efforts to recruit new partici-  
24 pants, progress of the program in meeting goals and

1 timelines, and a strategic plan for funding of activities  
2 across agencies.

3 **SEC. 202. CLASS 8 TRUCK AND TRAILER SYSTEMS DEM-  
4 ONSTRATION.**

5 The Secretary shall conduct a competitive grant pro-  
6 gram to demonstrate the integration of multiple advanced  
7 technologies on Class 8 truck and trailer platforms with  
8 a goal of improving overall freight efficiency, as measured  
9 in tons and volume of freight hauled or other work per-  
10 formance-based metrics, by 50 percent, including a com-  
11 bination of technologies listed in section 201(a). Applicant  
12 teams may be comprised of truck and trailer manufactur-  
13 ers, engine and component manufacturers, fleet cus-  
14 tomers, university researchers, and other applicants as ap-  
15 propriate for the development and demonstration of inte-  
16 grated Class 8 truck and trailer systems.

17 **SEC. 203. TECHNOLOGY TESTING AND METRICS.**

18 The Secretary, in coordination with the partners of  
19 the interagency research program described in section  
20 201(a)—

21 (1) shall develop standard testing procedures  
22 and technologies for evaluating the performance of  
23 advanced heavy vehicle technologies under a range of  
24 representative duty cycles and operating conditions,  
25 including for heavy hybrid propulsion systems;

- 1                         (2) shall evaluate heavy vehicle performance  
2                         using work performance-based metrics other than  
3                         those based on miles per gallon, including those  
4                         based on units of volume and weight transported for  
5                         freight applications, and appropriate metrics based  
6                         on the work performed by nonroad systems; and  
7                         (3) may construct heavy duty truck and bus  
8                         testing facilities.

9 **SEC. 204. NONROAD SYSTEMS PILOT PROGRAM.**

10                  The Secretary shall undertake a pilot program of re-  
11                  search, development, demonstration, and commercial ap-  
12                  plications of technologies to improve total machine or sys-  
13                  tem efficiency for nonroad mobile equipment including ag-  
14                  ricultural and construction equipment, and shall seek op-  
15                  portunities to transfer relevant research findings and tech-  
16                  nologies between the nonroad and on-highway equipment  
17                  and vehicle sectors.

18 **SEC. 205. REPEAL OF EXISTING AUTHORITIES.**

19                  (a) IN GENERAL.—Sections 706, 711, 712, and 933  
20                  of the Energy Policy Act of 2005 (42 U.S.C. 16051,  
21                  16061, 16062, 16233) are repealed.

22                  (b) ENERGY EFFICIENCY.—Section 911 of the En-  
23                  ergy Policy Act of 2005 (42 U.S.C. 16191) is amended—  
24                         (1) in subsection (a)—

- 1                             (A) in paragraph (1)(A), by striking “vehi-  
2                             cles, buildings,” and inserting “buildings”; and  
3                             (B) in paragraph (2)—  
4                                 (i) by striking subparagraph (A); and  
5                                 (ii) by redesignating subparagraphs  
6                                 (B) through (E) as subparagraphs (A)  
7                                 through (D), respectively; and  
8                             (2) in subsection (c)—  
9                                 (A) by striking paragraph (3);  
10                                 (B) by redesignating paragraph (4) as  
11                                 paragraph (3); and  
12                                 (C) in paragraph (3) (as so redesignated),  
13                                 by striking “(a)(2)(D)” and inserting  
14                                 “(a)(2)(C).”
- 15                             (c) ENERGY STORAGE COMPETITIVENESS.—Section  
16                             641 of the Energy Independence and Security Act of 2007  
17                             (42 U.S.C. 17231) is amended—  
18                                 (1) by striking subsection (j);  
19                                 (2) by redesignating subsections (k) through (p)  
20                                 as subsections (j) through (o), respectively; and  
21                                 (3) in subsection (o) (as so redesignated)—  
22                                     (A) in paragraph (2), by striking “and;”  
23                                     after the semicolon at the end;  
24                                     (B) in paragraph (4), by inserting “and”  
25                                     after the semicolon at the end;

- 1                             (C) by striking paragraph (5);  
2                             (D) by redesignating paragraph (6) as  
3                             paragraph (5); and  
4                             (E) in paragraph (5) (as so redesignated),  
5                             by striking “subsection (k)” and inserting “sub-  
6                             section (j)”.

○